(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: 0 234 805 A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 87301169.6

(22) Date of filing: 11.02.87

(51) Int. Cl.4: B 23 K 26/00
B 31 B 1/90

(30) Priority: 20.02.86 NO 860644

(43) Date of publication of application:
02.09.87 Bulletin 87/36

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI NL SE

(71) Applicant: Elopak A/S
N-3430 Spikkestad (NO)

(72) Inventor: Dyre-Hansen, Hans
Nedre Gleinasen 1
N-3430 Royken (NO)

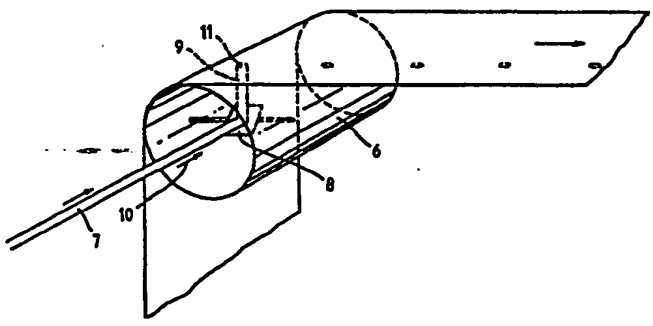
Thorstensen, Bernt
Sarabratveien 9D
N-0687 Oslo 6 (NO)

(74) Representative: Cline, Roger Ledlie et al
EDWARD EVANS & CO. Chancery House 53-64 Chancery Lane
London WC2A 1SD (GB)

(54) A method and a device for forming weakened areas in blanks for containers.

(57) A method and a device for selective weakening of limited areas of a material intended for the production of containers for liquids, especially beverages, with a material for the containers that is built up of a number of layers (I-5) at least one of which is a metal film layer (4). A hole (11) defined as to dimensions and depth is melted from the outside by the aid of a laser beam (7) hitting said layers (I-5) with such an intensity and during such a period of time that only the desired thickness of layers (I-3) is melted through.

Fig.2.



EP 0 234 805 A1

Description

A method and a device for forming weakened areas in blanks for containers.

The present invention relates to a method and a device for selective weakening of limited areas in a web of material for containers for liquids, especially beverages, when the material for said containers is built up from several layers at least one of which is a metal film.

In containers for beverages it is often desired to provide a weakened area in the container, which weakened area is intended for penetration, e.g. by a straw. In case of mass production of such containers it is relatively complicated to form such weakened areas, relatively strict demands being made on such areas. The weakened area must not become leaky during storage and transport, and at the same time penetration must be possible without too much force being exerted.

The build-up of the wall surfaces of such containers is, conventionally, made from a blank of cardboard that is covered with thermoplastic, e.g. polyethylene, on both sides. Additionally, an aluminium film layer is provided on the inner surface, and said aluminium film is covered with another plastic layer, e.g. of polyethylene.

When forming the weakened area for penetration it is important that all these layers are not destroyed, and usually, only the outer polyethylene layer, and the cardboard layer are provided with a hole, whereas the metal film layer, and both inner plastic layers remain intact. The method most used to day is that a hole is bored by a drill from outside, in which case is is important to be able to control said drill with precision to avoid damaging the inner layer. This requires very accurate control and very accurate dimension monitoring of the layers in the container wall. Said drilling method is, thus, relatively sensitive to errors.

Another possibility is to provide weakening by melting away the upper layer, but the results are not very satisfactory. Both mentioned known methods also require a certain period of time and will, thus, delay the production process.

It is an object of the present invention to provide a new method and a new device for forming weakened areas in limited areas on a web of material for a container, which method can be carried out rapidly, should result in an accurately dimensioned weakening area, and at precicely the right place on the web of material, so that said web can then be cut for assemblage to containers that have their weakened areas provided at the same place in all containers.

This object is achieved by a method and a device that are characterized by the features stated in the claims.

By using a laser beam that is directed into a continuously rotating drum, and by controlling the speed of rotation and the sector where said beam influences said web, it is possible to achieve quite exact conditions both of placing a weakened area, and of the deapth of said weakening, at the same time as this may be carried out with continuous feed of said web with high speed.

The invention is now disclosed in more detail with reference to an embodiment shown in the drawing, which diagrammatically shows:

Figure I a sectional view of a web of material for a container, with the penetration depth of a laser beam indicated,and

Figure 2 an elevational view in perspective illustrating the principle of the performance of a device according to the invention.

The web of material intended for production of containers for beverages, and which is to be provided with weakened areas which, in the finished containers, e.g. are to be situated in the top surface area of said container, is of a known kind and, e.g. comprises five layers, as shown in Figure I. A cardboard layer 2 is covered on the outside by a thermoplastic, e.g. polyethylene I, and is on the inside provided with an additional thermoplastic layer 3, an aluminium film 4, and an innermost thermoplastic layer 5. A web of a material showing said composition is fed over a conveying cylinder to not shown working stations where said web is divided into the desired dimensions for production of said container. The web is fed over cylinder 6 with a speed that may, e.g. be determined by the finishing speed at the subsequent working stations. Cylinder 6 is a hollow cylinder, and may, if desired, be a driven cylinder. In the direction of rotation of said cylinder a laser beam emitter, not shown in the drawing, is provided and emits a laser beam 7 in the axial direction into said cylinder. In said cylindder a mirror is secured in a manner not specified in detail at a distance from periphery of the cylinder corresponding to the area on the supplied web where it is desirable to provide a weakened area. Said mirror 8 is provided at an angle, e.g. of 45°, relative to the incident laser beam 7 and will, thus, reflect said beam as indicated by 9, directly towards said rotating cylinder wall. Being secured to the cylinder said mirror 8 will rotate with it, and the laser beam will, thus, circulate along a path I0 with said cylinder. In the projection of beam 9 a hole is provided in the cylinder wall with dimensions corresponding to the desired weakened area. In case of suction straw openings it is a question of circular holes having a diameter of 5-6 mm.

By rotating said cylinder and supplying said web of material, and by emitting a continuous laser beam 7 said beam will be continuously reflected by mirror 8, as shown at 9, and will hit the hole II in said cylinder, and from this place it will influence said web. Every time said hole in cylinder 6 is in contact with said web, the web is influenced by the laser beam until hole II again moves away from said web of material due to rotation, whereas said web is fed straight on, as shown in the drawing. The penetration depth of said laser beam into the web can be very accurately adjusted here by adjustment of the intensity of the laser beam and length/period of contact between laser beam and web. Said length/period of contact can be adjusted, either by adjustment of the feeding

speed, or by adjustment of length of contact between web and cylinder, since the contact area must not necessarily equal a quarter of a cylinder circumference as shown in the drawing.

In order to simplify the possibilities of adjusting said time/length of contact, furthermore, a covering screen may be provided inside said cylinder with an adjustable sector slot or a hole limiting the distance of influence of said laser beam on the web. Such a covering screen, that is not shown in the drawing, may be exchangeable or adjustable. In this manner it is possible to achieve penetration of said laser beam exactly through cardboard layer 2, without said beam touching the thermoplastic layer 3, which is an ideal condition. At the same time this process can be carried out with relatively high speed.

Many modifications of this principle are possible within the scope of invention. It is, thus, also possible to use a number of mirrors for forming a number of holes or weakened areas, and the deflection of said laser beam may also be modified.

Claims

1. A method for selective weakening of limited areas of a material intended for the production of containers for liquids, especially beverages, wherein the material of the containers is made from a number of layers of which at least one layer is a metal film,
characterized in that a hole defined as to dimensions and depth is melted from outside by the aid of a laser beam hitting said layers with such an intensity and during such a period of time that only the desired thickness of layer is melted through.

2. A method as defined in claim 1,
characterized in that the material for the production of containers is supplied over a rotating cylinder, that a laser beam is emitted along the axis of rotation of said cylinder into the cylinder, towards a fixed mirror rotating with said cylinder, and that said beam is reflected by said mirror towards a hole of desired size and shape in the cylinder wall, the rotational speed and/or length of contact between cylinder and web of material being controlled in accordance with the desired effect of irradiation.

3. A method as defined in claim 1,
characterized in that said material is fed over a rotating cylinder, that a laser beam is emitted axially and centrally into said cylinder towards a mirror that is turned over a partial sector of the cylinder surface, wherein an opening is provided to let said laser beam pass through and towards said web of material.

4. A device for selective weakening of limited areas of a material intended for the production of containers for liquids, especially beverages, wherein the material of the containers is built up from a number of layers, and comprises at least one layer of metal film,
characterized in a rotating hollow cylinder for supplying the web of container material, a laser beam emitter provided to emit a laser beam along the axis of rotation of said cylinder, a mirror provided inside said cylinder on the axis of rotation of said cylinder, and provided at an angle to reflect said beam towards the inner surface of said cylinder, and that said cylinder surface is provided with one or a number of through windows having a size corresponding to the desired weakened area.

5. A device as defined in claim 4,
characterized in that an adjustable covering screen with a fixed or adjustable sector slot for the laser beam is provided on the interior cylinder wall.

6. A device as defined in claim 4,
characterized in that more than one mirror means is provided inside said cylinder

Fig.1.

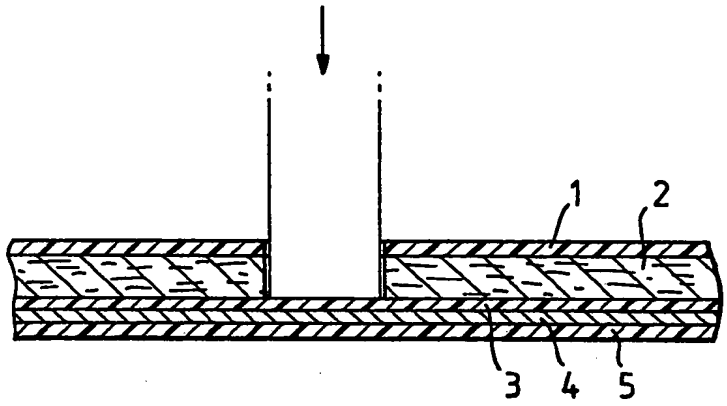
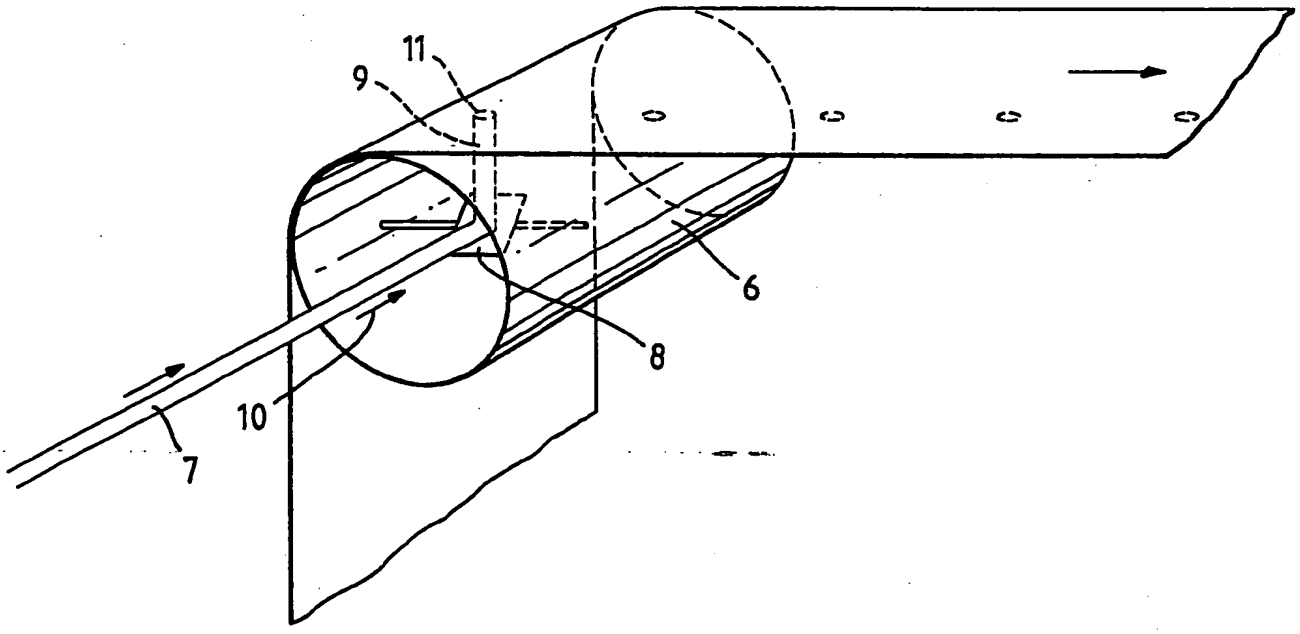


Fig.2.



European Patent Office

EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 87301169.6

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
	US - A - 4 549 063 (T. LIEM ANG)		B 23 K 26/00
	* Fig. 1-9; abstract; specification row 8, lines 55-60 *		B 31 B 1/90
X		1	
Y		1-6	
	--		
Y	US - A - 4 507 535 (W.T.BENNETT et al.)	1-6	
	* Fig. 4,5; abstract; sepcification row 8, line 25 - row 10, line 68 *		
	--		
A	EP - A1 - 0 101 016 (SIEMENS)	2,4	
	* Fig. 1; abstract *		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)
B 23 K
B 31 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	11-05-1987	SÜNDERMANN

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503 03 82